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# ANNUAL REPORT 2020



# **GRAND CHALLENGES ARE MOONSHOT GOALS**

To reach those goals and address the most urgent issues affecting our society, researchers from different disciplines must share knowledge, ask questions, and tear down academic barriers.

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# Bridging Barriers

we are pringing parriers between fundamental knowledge and real-world problems by connecting disciplines, techniques, and ways of thinking.

In 2016, The University of Texas at Austin introduced an initiative with one

issues — and figuring out the best way to solve them in less than a

overarching mission: break down academic silos and foster research that addresses the toughest questions facing humanity and the world.

Bridging Barriers serves as an incubator for some of the boldest interdisciplinary projects at UT by supporting researchers from across the Forty Acres as they form broad teams tasked with identifying urgent, realworld decade.

These projects are rooted in collaboration and academic freedom to produce practical solutions to social, environmental, and humanitarian crises. From artificial intelligence to climate change to health inequity, teams around campus are working on solutions to some of the greatest problems of our generation.

To learn more about Whole Communities–Whole Health and all of UT's research grand challenges, visit the **Bridging Barriers website.** 



# From the chair

# Unanging the way science heips society thrive is our grand challenge.

The COVID-19 pandemic has illustrated an awful truth: communities with access to fewer resources face grave health disparities. Seeing systemic inequity on display this year reinforced our mission: to reimagine how science can and should serve marginalized communities facing ever-increasing or disproportionate health challenges.

In spring 2021, we will kick off a five-year study to examine the health and the environment of families in eastern Travis County who have historically been left out of these discussions. advocates working alongside our research team. This is not an event; it is a process, and it will continue throughout the life of Whole Communities–Whole Health.

The second piece of the puzzle involves making our team's technological innovations available to the communities that need it. This includes designing a home smart beacon and mobile app so participants have real-time information and resources.

And a third puzzle piece has become critically important as well: working

By using technology to measure the many factors that affect overall health, including physical activity, indoor air quality, and social connections, we can create a clearer picture of what true wellness looks like. We will then share the information we find with participating families and community advocates so data can be turned into actions that improve health now, not years from now.

Before we launch our cohort study, however, all the pieces of a complex puzzle must be positioned. One piece is building relationships among community leaders, institutions, and our own Community Strategy Team, which is made up of local together, in an ongoing basis, with families and community partners to design this study in a way that is responsive to their needs and concerns.

These pieces will provide the lens through which we focus all our efforts in 2021 as we begin our journey with study participants. It is an exciting time for us. Whole Communities–Whole Health is starting to take shape.

#### **Frances Champagne**

Professor, Department of Psychology Whole Communities–Whole Health Chair, 2020

#### September 2016

UT envisions a campus-wide interdisciplinary grand challenge program and invites researchers to submit concept papers for topics that span all disciplines.

May 2018

Ten local advocates and leaders sign on to be the inaugural Community Strategy Team, ready to advise, guide, and contribute to our process.

September 2018

Whole Communities–Whole Health officially launches. UT scientists, health experts, and psychologists build a team that will examine health inequities in Central Texas. Preparation for a 5-year cohort study with participants in southeastern Travis County begins. Our first pilot study among UT students (UT1000) starts.

AugustPartnering with UT's School of Nursing, the ICAN Act2018project team conducts 125 in-person family homeinterviews. A public health nurse accompanies thevisits to address any immediate family concerns andprovide resources.

**April** 2019 Whole Communities–Whole Health hosts the Science
and Advocacy Symposium for community advocacy
groups and research experts to better bridge the gap
between science and real-world change.

Summer 2019

Inspired by tech industry hackathons, a small group meets intensively in what they call a "Dashboard Dash." In just two months, the team develops the first working prototype of the dashboard app, which is designed to return data to participants in a useful way.

#### March 2020

The COVID-19 pandemic halts home visits for our inperson household survey, which began the previous summer. We convert the protocol to a remote (online or phone) interview designed to explore family and community strengths, challenges, and aspirations. More than 135 families in southeastern Travis County participate. The results will inform and fine-tune cohort study protocols.

#### June 2020

infrastructure to create the Protect Texas Together mobile application. In 80 days, the team develops, tests, and refines the first version of the app, which has been used to help the UT community — including 51,000 students and 25,000 faculty and staff — meet the challenges associated with the COVID-19 pandemic. More than 34,000 people downloaded the app between August 2020 and February 2021.

Whole Communities–Whole Health uses its own tech

Fall

The research team divides into seven working groups focused on different areas of health. Each group includes a member of the organizing committee, members of the Community Strategy Team, and other UT researchers. They discuss methods of measurement for the cohort study protocol and author questions for the community focus groups conducted between November 2020 and January 2021.

#### 2020

#### December 2020

Whole Communities–Whole Health hosts its firstever <u>Research Showcase</u>, sharing the results of its work in the first two years with university colleagues and community partners. (Left to right) Hornsby-Dunlap Elementary Principal Helen Dunne Garcia, Community Coalition for Health founder Charles Moody, It's Time Texas program director Vanessa Castro, and Department of Civil, Architectural and Environmental Engineering Professor Kerry Kinney discuss the joys and challenges of working together with community partners at an Opportunity Forum hosted by Whole Communities–Whole Health.

# Addressing health inequities

Recent advances in science give us the unprecedented ability to understand health and human behavior — including physical activity, emotions, environmental exposures, and social interaction — and to use that knowledge to extend our quality and length of life. But when it comes to life expectancy, ZIP code continues to matter more than genetic code. At the same time, advances in the Internet of Things (IoT) also means we can collect and analyze data in new ways from connected devices. Unfortunately, science and technology aren't serving everyone equally. Communities with access to fewer resources face unacceptable health disparities.

Whole Communities–Whole Health is designing a 5-year cohort study to understand more about these factors and how they affect the health of families facing systemic injustice. We've spent the last two years collecting data about social determinants of health while listening to people living and working in marginalized communities in eastern Travis County — asking what matters most to them when it comes to building a more socially just, equitable, and healthy future for their families. While researchers have a wealth of knowledge in their specific fields, families facing challenges are experts in their own experiences. In conversations with these families, we're hearing a deep desire to secure a happy, healthy future for their children and frustration with problems outside of their control, like air and water pollution where they live and poor access to grocery stores, greenspace, and health care.

"Relationship building. Sometimes this phrase seems trite, or as my mom would say: '¿con qué se come eso?' ('What do you eat that with?') That was her shorthand for asking how something was useful or how it would solve a problem. Seldom do we talk about what drives creating, nurturing, and being in relationships, and — more important — how talking about this is useful to achieving shared goals. Of course, it gets more complicated when we talk about science and research. Research can seem like a solitary enterprise (my brain and my team) or as an elitist quest (leave it to the experts). But it need not be."

Lourdes Rodríguez, Whole Communities–Whole Health founding member and now senior program officer at St. David's Foundation, describes what it means to put science in service to society. **Read more.** 

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These insights and expertise will inform our cohort study as we uncover the factors that affect the overall health of those who have been historically left out of the research process. We will then return the information we learn as quickly as possible so that families and partner organizations can make changes that ensure better health in the future.



# WHOLE COMMUNITIES WHOLE HEALTH

# **EXPANDING NETWORKS**

270 University of Texas departments and units

21 student researchers community researchers

advisors

28 external partners

# **BUILDING CAPACITY**

# \$4.8M Awarded in external funding

Contributed expertise to MORE \$1.7M in externally funded projects and centers across UT CAMPUS & COMMUNITY OUTREACH

2,460 COVID activity kits distributed to local families

**3,500+** visits to CentralTxHelp.org

**34,000+** Protect Texas Together app downloads

# HIGHLIGHTS IN NUMBERS FY2020

# **SCHOLARLY OUTPUT** & PUBLICITY

Pilot and ongoing projects





### Scholarly works



News articles, op-eds, blog posts, & university stories

# **DESIGNING A COHORT STUDY**

20,600 hair strands collected for analysis

9,500,000 SARS-CoV-2 viral gene copies detected in dust

70+ home beacons built

100+ gallons of sewage recovered 2,975+ study participants to date Department of Kinesiology and Health Education Professor Darla Castelli (left) and Department of Surgery and Perioperative Care Assistant Professor Karla Lawson (right) visit a community garden at the Central Texas Food Bank during Whole Communities–Whole Health's "A Day in the Community."

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# Fostering happier, healthier lives

Our mission: better understand and address what matters most to communities facing health disparities so families can lead healthier, happier lives. We move toward this goal by fundamentally reimagining the way we do research.

#### **Including the Whole Community**

We are welcoming people who have been historically excluded from research studies to participate and partner with us. Centering the lived experiences of marginalized communities inherently changes and improves our process and our outcomes.

#### **Bringing Science Home**

We believe that families are the experts in their own health, and we're putting community input first each step of the way. We intend to share our results quickly through a smartphone app so participants can make informed decisions about their own health. Community partners also will use the data we gather to advocate for changes at the city and county level to improve systemic issues contributing to poor overall health.

#### Looking at the Whole Picture

Whole Communities–Whole Health's researchers are looking at hundreds of variables that affect health, from individual decisions to system-wide issues. By combining information about a home's environmental quality with biological health markers, interactive family surveys, and community-level data, we'll help develop a more holistic picture of health over time.

# Our network

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The Whole Communities–Whole Health Grand Challenge team includes researchers from more than two dozen disciplines, such as psychology, nursing, social work, and engineering, as well as community groups like Community Coalition for Health and MEASURE.

![](_page_16_Picture_3.jpeg)

Explore our <u>network map</u> or browse the <u>team list</u> on the Whole Communities–Whole Health website to see how our connections are contributing to our overall mission of improving health outcomes by putting science to work in service to society.

# Including the whole community

We are welcoming people who have been historically excluded from research studies to participate and partner with us. Centering the lived experiences of marginalized communities

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![](_page_17_Picture_2.jpeg)

# inherently changes and improves our process and our outcomes.

The vast majority of health research is not based on the current diverse ethnic, cultural, and socioeconomic make-up of the United States. Although many in the scientific community are committed to equal representation, <u>a 2018 meta-analysis</u> looking for genetic variants associated with disease found that under-representation persists: 78% of study participants were of European ancestry. The reasons for this are varied but undoubtedly stem, in part, from the way scientists have treated minoritized groups in the past. Exploitative practices like withholding treatment from participants or experimenting on them without their consent have understandably led to broken trust.

We must acknowledge this and work to reimagine the way we approach community-based research. For our grand challenge team, that means including participants and community advocates early and often in the process. Together, we are MuraLon New York's Lower East Side. Photo credit: aesthetics of crisis

![](_page_18_Picture_1.jpeg)

designing a study that uncovers the ways injustice produces inequitable outcomes while highlighting the key factors that can help these communities thrive despite systemic inequity.

One way we are doing this is by partnering with under-resourced schools as well as the nonprofit advocacy group MEASURE, which has been working with us to conduct a series of bilingual focus groups with parents living in and around Del Valle. MEASURE uses data and education to empower communities to reduce racial disparities. And while we still have a long way to go, we seek to shift research power to communities of color, which are often neglected in traditional cohort studies. For us, that began by designing pilot studies that helped us learn how to use technology to meet people where they are—in their schools and homes—and to find ways to involve participants in the scientific process.

# Sensing Daily Activities

We recruited participants from Federally Qualified Health Centers and Federally Subsidized Child Care centers to look at how moment-tomoment interactions between parents and children may affect child development as well as child and parental mental health. In this pilot study, we used wearable and smartphone technology to sense child hyperactivity and tantrums, caregiver warmth or harshness, and child and caregiver play. The goal was to see if different encounters led to common and troubling behaviors, like defiance and aggression. Our team intentionally included lower-income families who have been historically underrepresented in this type of research. The hope is to find non-intrusive ways to measure the frequency and intensity of developmental and behavioral difficulties so we can design innovative, low-burden assessments that will help mental health professionals tailor interventions.

![](_page_19_Picture_3.jpeg)

### Read the research: Sensing Everyday Activity: Parent Perceptions and Feasibility Infant Behavior and Development Hannah I. Levin, Dominique Egger, Lara Andres, Mckensey Johnson, Sarah Kate Bearman, Kaya de Barbaro <u>View</u>

#### National Science Foundation

Computer Science for All "An Equity-Focused Approach to Integrating Physical Activity and CS Education for K-8 Learners"

Project SMART: The Gamification of Physical Activity in Schools

We partnered with Title 1 elementary schools in Del Valle ISD to understand how physical activity can improve health. Getting active is associated with better performance in school, but sitting and screen time are on the rise, and most children do not meet the recommended 60 minutes of daily moderate-tovigorous physical activity. With Project SMART or Systematic Metrics of Active Routes of Transport, our researchers collaborated with local teachers to create, test, and modify a cooperative educational game coupled with lightweight wearable devices to increase physical activity and healthy eating

among local 4th and 5th graders. Students joined in the scientific process by programming the wearable devices themselves so they could monitor their own physical activity, including walking and biking to school and being more active at recess or between classes. Initial findings suggest that children tend to overestimate how physically active they are and underestimate the physical activity's intensity. Educators and students will continue to inform the way we identify health benefits associated with the larger Whole Communities-Whole Health cohort study.

"My introduction to Whole Communities–Whole Health began when I submitted a concept paper to address local health inequities through my local non-profit organization, The Community Coalition for Health. This opened the door for my invitation to the Community Strategy Team. I was brought into a world of academics who possessed a unique collective passion to use their skills in research to positively impact their local community, particularly those who have been marginalized. My organization has been energized by the collaborations formulated through Whole Communities–Whole Health, which have expanded our reach in the community and enhanced our ability to obtain grant funding."

#### - Dr. Charles Moody

Founder and CEO, Community Coalition for Health

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![](_page_21_Picture_5.jpeg)

new normal when it comes to a community partnership with Black-led research nonprofits. Far too often, organizations run by people that look like me are disqualified and ignored by academia. That narrative is being rewritten through MEASURE's partnership with Whole Communities–Whole Health."

> **— Meme Styles** Founder, MEASURE

Jameila "Meme" Styles, founder of MEASURE. A mural in the cafeteria at Del Valle Middle celebrates people from different cultural backgrounds coming together to learn and grow. Photo credit: B. Birzer

# **Our Partners**

Some incredible nonprofits and educators, both locally and nationally, have worked with Whole Communities–Whole Health by hosting outreach events, offering insight into community needs and strengths, sharing tips from their experiences with community-based research, and connecting us with families and local advocates who want to join our work. Whole Communities–Whole Health thanks them for their interest, engagement, and commitment to health equity in Central Texas.

#### Action for Healthy Kids

Active Schools Any Baby Can Austin Boys and Girls Club Austin Independent School District AVANCE BASTA Blackland Community Development Corporation Boomers Collaborative Central Health Central Texas Food Bank CommUnity Care Community Coalition for Health Del Valle Independent School District Del Valle WIC Clinic El Buen Samaritano

Girl Scouts Gus Garcia Young Men's Leadership Academy It's Time Texas MEASURE People's Community Clinic Pflugerville Independent School District Round Rock Independent School District Sickle Cell Association Texas Action for Healthy Kids United Way for Greater Austin UT Children's Wellness Center YMCA of Austin

![](_page_23_Picture_0.jpeg)

# Looking at the whole picture

By combining information about a home's environmental quality with biological health markers, interactive family surveys, and community-level data, we'll help develop a more holistic picture of health over time.

Many scientists focus solely on a single aspect of health, like nutrition or air quality. But health and wellbeing are complex and interconnected. Each aspect is a piece of a puzzle. To get the full picture, researchers must assess the ways that different variables interact to affect a person's physical and mental health. How does chronic stress affect a child's potential for academic success? What systemic problems lead to health inequities and injustices? While access to healthcare is a serious issue, the best medical care can still only address <u>10 to</u> <u>20 percent</u> of the health concerns families and communities face. What can we learn about the other 80 to 90 percent? And how can we share what we learn with the people who can best turn that knowledge into action?

To do this, we first need to expand our vision of who is included on a research team. Whole Communities—Whole Health includes experts from nursing, developmental psychology, environmental engineering, data science, and more who are working together to design a research protocol that examines the complete picture of health. We also rely on the insight and wisdom of 12 dedicated advisors on our Community Strategy Team and from participating families, schools, and local organizations. When we welcome all voices to the table, we arrive at better research questions, develop culturally attuned technology, expand our understanding of the world, and find new opportunities to use data to solve real-world problems.

![](_page_25_Picture_0.jpeg)

In order to prepare for our cohort study, we conducted a pilot test with UT students during the 2019-2020 school year to learn more about the overall factors that affect their health. We used sensing technology like smartphone apps and wearable technology, environmental home beacons, selfreported surveys, and readily available group-level information like grades and attendance to get a peek into the lives of undergraduates. We looked at stress levels, sleep habits, and physical activity to see how this affected students' overall wellbeing. The process allowed our team to learn more about how to set up the technology that will be used in our cohort study and how to handle large amounts of real-time data.

It also has given us insight into how to conduct "contactless" science, in which we collect information without face-to-face interaction. **Read more about our findings** and **learn how cell phone Bluetooth data can predict loneliness — even in a crowded room.** 

# **National Science Foundation**

Division of Social and Economic Sciences Methodology, Measurement and Statistics (MMS) "SABLE: Sensor-Based Assessment of Behavioral Lifestyles and Experiences"

![](_page_25_Picture_6.jpeg)

# Understanding How Discrimination During Adolescence Affects Health

Discrimination is a part of everyday life for most Black and Latinx youth. Although many studies document its destructive effects, we know almost nothing about how it influences health over time, including how bias and mistreatment contribute to racial and ethnic health disparities or how chronic stress leads to chronic disease. This ongoing Whole Communities–Whole Health pilot study tests the feasibility of integrating real-time measurement methods, including sleep quantity and quality, physical activity, and cardiovascular indicators, with daily journal entries and other available community-level data. The goal is to examine how discrimination affects

health during adolescence in order to suggest possible interventions.

This past year, our team recruited 145 Black and Latinx adolescents who agreed to have their activity and health tracked with wearable technology and to submit daily surveys and nutrition information from their phones. We found that kids were most receptive to using technology to take part in our studies, including having their cell phone activity monitored. Through this process, we're learning what ways of collecting information will allow us to see a more layered, interconnected picture of health without asking too much of participant's time and attention.

![](_page_26_Picture_5.jpeg)

"Having access to UT researchers has been a benefit for our campus and community. They have brought resources, information, and an awareness of health consciousness that will help us reach our goals of having a healthy whole child. I have learned a lot about advocacy and understand now that persistence is key to advocating for those in need."

- Helen Dunne Garcia Principal, Hornsby-Dunlap Elementary Civil, Architectural and Environmental Engineering Assistant Professor Pawel Misztal studies air quality in southeast Austin as part of Whole Communities-Whole Health.

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"I started my assistant professorship position at Cockrell School of Engineering in Fall 2019 with an ambitious vision to address big air quality questions and quantify the factors that affect human health. To address such big questions, engineers, scientists, medical practitioners, and communities need to work together. Upon joining Whole Communities–Whole Health, I was extremely impressed by the diverse team expertise being already used fruitfully to solve big problems for vulnerable communities. As a new professor with broad interdisciplinary thinking, this was perfectly consistent with my desire to engage in research that is not just high impact but that directly helps local and global communities. Whole Communities–Whole Health was like a godsend to me."

#### - Pawel Misztal

Assistant Professor

Department of Civil, Architectural, and Environmental Engineering

# What Is a Complete Picture of Health?

If you only view a person's health through a single lens, like their medical history or diet for example, you will miss the whole story. Where we live, how we play and learn, our social connections, and our access to healthy food and greenspace all play a role in our overall health and happiness. By looking at how several health factors interact with each

other, our team is hoping to get a more holistic view of how a variety of circumstances can work together to promote or harm longterm health outcomes for children and families. We are examining these and other aspects of health, which encompass many of the top concerns we've heard from the community:

#### Physical activity

Stress

#### Experiences of discrimination Nutrition

Home environment, such as air and

water quality

Sleep quality

Child-caregiver connection

#### Coping skills Access to greenspace and recreational facilities

- Academic performance
- Biological health markers such as
- glucose, heart rate, weight,
- vitamin levels, creatinine, and
- hormone levels

![](_page_28_Picture_19.jpeg)

![](_page_29_Picture_0.jpeg)

Civil Engineering graduate research assistant Sepehr Bastami builds the second iteration of a smart home beacon, which will be used to study participants' indoor air quality.

A S B S B.

# Bringing science home

we believe that tamilies are the experts in their own health, and we're putting community input first each step of the way.

Results from traditional science have difficulty making their way into the real world. Researchers decide what questions to study, obtain information from participants, and then publish results that may never reach beyond a scientific journal's academic audience. It can take years before important treatments and therapies are available or applied, and we don't always consider how the results of our work could be shared with people, agencies, or local organizations in a practical way much sooner.

affecting air quality and their family's health, and this concern supported information our team received from a community partner that the area suffers from disproportionate number of childhood asthma cases.

Our plan calls for the feedback loop to be a continuous cycle at every stage of our study. In 2018 and 2019, our researchers attended dozens of community events in southeastern Travis County, asking families what mattered most to them when they thought about their health. Several community members wondered if nearby industrial complexes were

This is just one example of how community-driven insight informs our work, and because of it, we'll be measuring participants' home air quality. If sensors notice especially high levels of pollutants or irritants, the smartphone app we've created will record those high levels and offer recommendations for reducing them in real time, such as turning on a vent or opening a window while cooking or cleaning. And when we look at data in aggregate, we'll be able to see which variables, both inside and outside the home, are affecting air quality the most and if there are community-wide trends. As we head into a soft launch of the cohort study in the first half of 2021, we'll be seeking feedback from the first group of participants we enroll—who we'll call Ambassador Families—to ensure that the methods we're using are as non-intrusive and helpful as possible.

Finally, as we gear up for the second phase of enrollment in the summer and fall of 2021, participants will have access to their own health information and community data on their smartphones. As the study progresses, we'll share anonymized and aggregated communitywide information with organizations and advocates who can put that data to use to improve policies and support long-term community health and wellbeing.

The rest of this section details how we're using technology to give families the information they need to improve their health.

![](_page_31_Picture_4.jpeg)

Margarita García roasts cocoa beans at her chocolate factory, Lanní Chocolate, in Oaxaca, Mexico. Whole Communities–Whole Health brought its smart home beacon to the chocolate factory to test its ability to measure indoor air quality.

# Building a Smart Home Beacon

Traditional health studies often rely on periodic participant surveys for updates about their wellness, but these can be sporadic and subjective. We will use

We plan to give this information back to our participants quickly so they can make appropriate changes to their behavior and their environment based on the data they receive. To refine the beacons, we tested them in student homes this past year as part of the UT 1000 study. We also took them along with us on a student trip to Oaxaca, Mexico, to measure air contaminants at a local chocolate factory. Researchers have rolled out several updates based on design feedback, like the simple ability to turn the beacon off. We aim to place the devices in homes in eastern Travis County this year as part of our 5-year cohort study. Read more. 🕳

technological devices to collect information about health in real time and to understand how the interplay between different variables — like air quality and sleep — can affect health. We brought together a team from Dell Medical School and the departments of Psychology, Electrical and Computer Engineering, and Civil, Architectural and Environmental Engineering to construct a smart home beacon that can be placed in residences to monitor things like indoor air pollution, carbon dioxide levels, humidity, and temperature on a consistent basis to understand how these factors affect health.

# Dashboard Development

Traditional, long-term research projects share results with participants at the end of a study, but often the information they receive is too little, too late. To address this, Whole Communities–Whole Health is developing an interactive smartphone app that will translate raw data collected during the study into actionable knowledge. Participants will be able to discern patterns in their own sleep quality, mood, physical activity, and environment (among other variables), which are detected using the home beacon and wearable technology. The app also will provide suggestions based on that data so participants can make adjustments as the study progresses.

Our team is also learning how to incorporate community-level information to give participants an understanding of how their households fit into the broader context of health within their community. As results are analyzed over time, local organizations can pinpoint issues and concerns on a systemic level and use this evidence to advocate for new policies or programs. We shared early prototypes of the dashboard with community members and potential participants in 2019, and Ambassador Families will test the dashboard and provide additional feedback in the first half of 2021. Elements of the dashboard laid the foundation for the Protect Texas Together app, which The University of Texas at Austin deployed in response to the COVID-19 pandemic.

# Benefits of Remote Science

Re-thinking the research process to make it more accessible also means finding methods of sample collection that don't require participants to drive to a facility or scientists to come into their homes. In our CLEAR Homes study, we have been investigating how to partner with community members to collect environmental and health data remotely using state-of-the-art technologies. We have developed methods to ship home sampling kits to participating households so they can collect their own indoor dust samples and send them to our laboratories. We conducted several test-runs in last summer's heat to ensure that shipping would not degrade the samples. When we received them, we measured what types of chemical pollutants, microorganisms, and allergens were present. This data will allow us to understand what indoor air pollutants families are exposed to and help us identify ways to reduce these exposures.

![](_page_34_Picture_0.jpeg)

### Ensuring Participants' Privacy

"The first decision we made as a

sharing personal information with

group was to protect users' privacy as much as we could. That drove many of the other design decisions we made throughout the development process," says Electrical and Computer Engineering Professor Christine Julien who, along with Diagnostic Medicine Associate Professor Cameron Craddock, helped design the Protect Texas Together mobile app and are now working with fellow researchers to design the Whole Communities– Whole Health dashboard.

For the grand challenge team, safeguarding privacy means not

outside groups, anonymizing data before it's aggregated so that multiple threads of information cannot be reassembled into identifiable information, and ensuring on the backend that our work can't be hacked or accessed by people without permissions. "Traditionally, the communities we study have been leery of being tracked and monitored, and rightly so. It's not their responsibility to offer trust; it's our responsibility to earn it," adds Michael Mackert, Center for Health Communication director and professor of Population Health.

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Environmental and Water Resources Engineering graduate students David Jarma (left) and Emma Palmer (right) work in the laboratory to analyze wastewater samples to detect the SARS-CoV-2 RNA signature. Photo credit: Mary Huber

# Fighting COVID

When Whole Communities–Whole Health started its work, the world was a very different place. We were in a sprint to launch a 5-year community cohort study that would help bridge the gap between science and advocacy.

Then a worldwide health crisis emerged, introducing unforeseen challenges affecting all aspects of daily life. At the same time, the sociopolitical climate around race and equity has been a call to action for all. These issues are central to our mission, and they are the motivation for our foray into interdisciplinary research, which relies on each person's unique perspective.

Our team has met the challenges of this changing world and the research landscape before us. While some of our work has hit delays because of the pandemic, we are proud of what we were able to achieve during the shutdown. Our teams have used their expertise both to help address the COVID-19 pandemic and to learn from it. And fortunately, we were well poised to contribute to our own campus community because we spent the first two years of our grand challenge journey developing technological tools to measure physical and mental health remotely. That has given us a wealth of

# Hunting for COVID-19 in Human Waste

expertise in app development, data processing, the dynamics of participant engagement, and issues related to data privacy and security. The pandemic, while devastating, has given us an unlikely and unexpected testbed where we could try our methods quickly in a high-stress situation. We have gleaned new insights into how to use environmental cues to measure health, which will make our cohort study even better. Here are a few ways we applied our collective expertise to keep Texans healthy during the COVID-19 pandemic:

1900s, is continuing to monitor virus levels in Austin's wastewater with the goal of understanding and predicting the spread of COVID-19 in our community. **Read more.** 

Whole Communities–Whole Health researchers are used to looking to the environment to understand cues about human health. When the novel coronavirus began spreading across the United States, researchers from the Cockrell School of Engineering, the Texas Advanced Computing Center, and the Environmental and Water Resources Engineering program had the idea to track the virus by looking at wastewater because SARS-CoV-2 is fecally shed. This "Canary" project, named after the birds used to signal danger to coal miners in the early wastewater because SARS-CoV-2 is

![](_page_36_Picture_6.jpeg)

# Designing the Protect Texas Together App

On August 26, 2020, students returned to the UT campus amid the COVID-19 pandemic. The university was one of many across the country that relied on technology to aid that process. A number of companies developed mobile applications to help with things such as symptom tracking and contact tracing, but rather than adopt another company's technology, UT decided to turn to its own in-house experts to design an app that met its specific needs. The Protect Texas Together app, available in English and Spanish, has a symptom diary, campus room log to assist with contact tracing, a list of medical resources, and the ability to link employees' and students' proactive (asymptomatic monitoring) COVID-19 tests with their UT electronic IDs to speed up the testing process and reduce the amount of time spent in a testing queue. Moreover, all data are confidential, and users have the ability to store or delete information at will. To date, more than 34,000 people have downloaded the app.

It also allows students, faculty, and staff to find a testing location and track campus, county, and statewide COVID-19 statistics. In 80 days, UT was able to build an app because Whole Communities–Whole Health researchers were already designing the necessary technology infrastructure when the pandemic started, which included a mobile dashboard to share cohort study results with participants. **Read more**.

![](_page_37_Picture_3.jpeg)

The app also uses an algorithm to determine whether it is safe for someone to come to campus based on the symptoms they select, then issues a digital day pass to that person if they are cleared.

# Coronavirus in Home Dust and HVAC Systems

Your air filter can tell you a lot about the quality of what you're breathing and how it may affect health. Kerry Kinney, professor in the Department of Civil, Architectural, and Environmental Engineering, Sharon Horner, professor in the School of Nursing, and Juan P. Maestre, Department of Civil, Architectural, and Engineering research associate, have been using what they call "filter forensics" for many years to learn about the wellbeing of Central Texans.

![](_page_38_Picture_2.jpeg)

Bacteria, fungi, and allergens are all things found in air filters that can provide a lot of information about what is present in the indoor spaces we occupy and how these exposures may affect health. Our researchers are now looking there for COVID-19 as well.

After detecting the genetic signal for the virus in dust recovered from surfaces and air filters in a home environment, Kinney and her team are looking more broadly at air filters found in ventilation systems in other types of buildings. Just like analyzing wastewater, dust and HVAC samples from buildings have the potential to help scientists identify where COVID-19 may be without having to rely on individual clinical diagnostic tests, which can't assess infection in aggregate quickly. And so far, their research has been successful. The team, including other Department of Civil, Architectural, and Environmental Engineering experts, has been able to detect the COVID-19 signal in HVAC filter systems, demonstrating — first and foremost that air filters are actually working to remove the virus from the air. This is also laying the groundwork for follow-up studies that will examine how the coronavirus moves through buildings and if indoor dust samples can be used as an indoor "canary" for COVID-19. Read the research.

![](_page_38_Picture_6.jpeg)

The Protect Texas Together app, created by Whole Communities– Whole Health researchers, has been used by UT students, faculty, and staff to schedule proactive (asymptomatic) COVID-19 tests. Students wearing masks and social distancing on campus in 2020. Photo credit: Callie Richmond.

# Understanding Student Health and Wellbeing During the Pandemic

38 Just before the pandemic, we were finishing a pilot study examining the relationship among biological indicators of stress, perception of stress, life events, and lifestyle in 51 UT undergraduate students. While it may "contactless" science, in which we collect information without face-to-face interaction. This is a skill that will likely serve us well as we launch into the next phase of Whole Communities–Whole Health. Through all these efforts, we are learning about community health — and learning how to be resilient scientists ourselves.

have been easier to call it a day and move on, it occurred to our research team that re-engaging our study participants to see how the pandemic has influenced these variables could give us additional insights into the processes of psychological risk and resilience. We were able to pivot the study rapidly, deploying wearable technology and phone app updates to participants remotely while conducting virtual observations from April to August 2020. Researchers are now analyzing that data. Beyond the data we've collected, this approach has taught us how to adapt established inperson methods to conduct

In 80 days, the Whole Communities–Whole Health team created, tested, and refined the first version of the Protect Texas Together app to help students, faculty, and staff navigate the fall semester more safely.

#### **PIVOTING IN A PANDEMIC**

# Creating Take-Home Activity Bags to Build Our Community

When the university — and school districts across the state — closed for inperson learning in March 2020 in response to the spread of COVID-19, our team was just starting to conduct inhome interviews with families living in southeastern Travis County. With faceto-face conversations off the table, we focused on developing relationships with families remotely. Interviews went online, and we developed a COVID resource

website and an "Ask a Scientist" portal to share our expertise in navigating the public health crisis. Working with Del Valle ISD, we also distributed 2,460 athome activity bags, including a resource guide, books, puzzles, sidewalk chalk, and supplies to make a homemade mask, to families to provide some fun and healthy activities to keep children engaged during the summer break.

### Coronavirus Perspectives: An Information Breakdown

Michael Mackert, Advertising and Public Relations professor and director

challenge to examine health mis- and disinformation during the COVID-19

of UT's Center for Health Communication, joins researchers from the Good Systems grand

pandemic. "Experts want to give those answers, but we just don't always have them right away." **Read more.** 

![](_page_40_Picture_10.jpeg)

UT Austin faculty and staff prepare classrooms and buildings for re-opening after campus was closed in March due to COVID-19.

# Looking ahead

The coming year will be a year of refinement: testing research protocols, listening closely to participant feedback and concerns, and updating our methodology. The start of our cohort study will begin with the And while we have gathered a wealth of information from community participants about what they want to see from our study, this initiative was never meant to be a "set-it-and-forget-it" process. Each step of the way, we have welcomed more voices to the table and incorporated new perspectives to help us address specific health equity issues that affect not only Central Texans but also marginalized communities around the country. As we move ahead, we will keep returning to that table, adjusting our approach and challenging our assumptions along the way. We will invite new partners to join us as we see opportunities to expand the use of our research for advocacy and other intervention efforts. We are committed to making sure whatever we learn will be shared with the families and community partners that can most quickly and effectively put that information to use for the benefit of all.

enrollment of Ambassador Families in spring 2021 to help us improve the technology we will use and identify the support we will need to provide to participants along the way. We will build up to our full cohort enrollment of 300 families by the end of 2022.

We're looking forward to seeing the results of two years' worth of labor and planning as we officially launch our cohort study. To date, more than 2,500 students across three waves of data collection have helped us refine our protocols, explore the relationships among the variables of interest, and develop new technologies.

![](_page_42_Picture_0.jpeg)

# Next Steps

In the coming year, we will braid together the three strands of our efforts to date: community engagement, technology development, and research planning. Here's what we're set to tackle next: 41

- We will prepare and share with participants a focus group summary with a historical timeline of local health disparities.
- The seven internal working groups established in Fall 2020 will reconvene to incorporate the insight gained from the community focus groups into research protocols. These working groups will create a set of action items to prepare the cohort study for launch.
- Task teams will take the working groups' action items and carry out the work to make the community cohort study a reality.

- In March 2021, a group of Ambassador Families will be our first enrollees in the study. These initial families will serve the dual role of participants and co-planners, helping us to fine-tune our methods and communications along the way.
- The Community Strategy Team will
  develop an action plan to explore how
  best to partner with local
  organizations, advocates, and
  municipalities so they can use the
  data we collect to address participant
  needs both now and in the long term.

In the grand challenge's first two years, Whole Communities–Whole Health researchers produced more than a dozen scholarly works.

**Research and scholarly output** 

In the grand challenge's first two years, Whole Communities–Whole Health researchers produced more than a dozen scholarly works, including peer-reviewed

BEVO Beacon: A Low-Cost Sensor Platform to Monitor Indoor Environmental Quality

AAAR 2019, Portland, OR

42

Hagen Fritz, William Waites, Sepehr Bastami, Kerry Kinney, Zoltan Nagy articles, preprints, conference proceedings, posters, and presentations. All academic contributions are archived on <u>Texas ScholarWorks.</u>

Can I Health You? Integrating Health and Physical Education: The Whole Communities–Whole Health Story

2019; Integrated Public Health-Aligned Physical Education Conference. Columbia, SC

Darla Castelli

Beyond PETE and rePETE: Transdisciplinary team science integrating public health and physical activity into education

2020; American Educational Research Association SIG Catherine Ennis Scholar Award (postponed)

Darla Castelli

Ecologically Valid, Multimodal Data Collection

BuildSys 2020, Yokohama, Japan

Hagen Fritz, Kerry Kinney, Zoltan Nagy

#### Epigenetics, Environments and the Dynamic Brain

Dynamic Epigenetic Impact of the Environment on the Developing Brain

The Cambridge Handbook of Infant Development: Brain, Behavior, and Cultural Context

Frances Champagne

Fostering Healthy Mental, Emotional, and Behavioral Development in Children and Youth: A National Agenda

National Academies of Sciences, Engineering, and Medicine

Frances Champagne, as part of the Committee on Fostering Healthy Mental, Emotional, and Behavioral Development Among Children and Youth

2020; 7th Annual Mariann Blum Memorial Lectureship in the Neurosciences

Frances Champagne

#### **Epigenetics and Trauma**

2020; Roundtable on Legal Remedies for Racial Trauma, Berkeley Law

Frances Champagne

view

### Parental Epigenetic Influences Within and Across Generations

2019; Neuroscience Program Seminar, University of Illinois at Champaign-Urbana

Frances Champagne

**Project SMART: A Cooperative Educational Game to Increase** Physical Activity in Elementary **Schools** 

CHASE 2020: IEEE/ACM international conference on Connected Health: **Applications, Systems and Engineering Technologies** 

Ashley M. Matheny, Peter Marchetto, Je'aime Powell, Austin Rechner, Joon-yee Chuah, Erica McCormick, Suzanne A. Pierce

view

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### **Sensing Everyday Activity: Parent Perceptions and** Feasibility

**Infant Behavior and Development** Hannah I. Levin, Dominique Egger, Lara Andres, Mckensey Johnson, Kaya de Barbaro

**Selective Integration: Roles for Public Health** and Kinesiology and **Physical Education** 

Journal of Teaching in Physical Education

Darla Castelli, Latrice Sales

Whole Communities–Whole Health: A Community-Based **Participatory Research** Model to Study Children's Health

Darla Castelli, Karen Johnson, et al.

Whole Communities–Whole Health: Changing the way science helps society thrive

#### view

### Whole Communities-Whole Health: A **Participatory Team Science Cohort Model**

SRCD 2019: Society for Research in **Child Development Biennial Meeting** 

Sarah Kate Bearman, Julie Maslowsky

2019; Interdisciplinary Association for **Population Health Science Annual Conference, Seattle, WA** 

Amanda Barczyk

### Validity of a Dense, Low-**Cost Particulate Matter** Sensor Network BuildSys2020, Yokohama, Japan Hagen Fritz, Calvin Lin, Kerry Kinney,

Zoltan Nagy

![](_page_46_Picture_0.jpeg)

# Awards & grants

From FY19 through FY20, Whole Communities–Whole Health researchers received \$4.8M in external grants, gifts, and awards for Whole Communities–Whole Health-related research. These awards are listed below. In addition, Whole Communities–Whole Health has also contributed its expertise to date to more than \$1.7M of other externally funded research projects and centers at The University of Texas at Austin.

![](_page_47_Picture_2.jpeg)

**Episcopal Health Foundation** 

Anonymous Donation through Dell Children's Trauma and Injury Research Center

### \$10,000

**Episcopal Health Foundation** 

"Responses to COVID-19 among Parents (ReCAP): Understanding the Impact of COVID-19 on Central Texas Parents of Young Children"

\$10,000

### Build the Foundation for a Healthy Life Program

"Parenting A to Z (PAZ): Expanding Opportunities to Promote Positive Parenting Practices in Pediatric Primary Care"

### \$256,944

Michael and Susan Dell Foundation (Dell Medical School pass-through)

"Mobile Sensing to Detect, Prevent, and Treat Depression in Transition Aged Youth" \$50,000

![](_page_48_Picture_0.jpeg)

#### HOLE OMMUNITIES OMMUNITIES

KALL.

E HELPS SOCIETY THRIVE

Whole Communities–Whole Health researchers and community advisors discuss health equity at an Opportunity Forum in 2019.

Morris L. Lichtenstein, Jr. Medical Research Foundation National Institutes of Health – National Institute on Minority Health and Health Disparities

### Implementation Research Project Expansion

"Implementing ParentCorps in Corpus Christi Independent School District"

### \$423,388

National Institutes of Health – National Institute of Child and Human Development

"Biopsychosocial Pathways Linking Discrimination and Adolescent Health (K01 – COVID-19 Supplement)"

![](_page_48_Picture_13.jpeg)

"Socio-Cultural Stress Profiles, Stress Responses, and Health in Mexican American Adolescents (R01 – COVID-19 Supplement)"

\$195,626

![](_page_49_Picture_0.jpeg)

**National Science Foundation** 

**National Science Foundation Computer Science for All** 

#### **Civil Infrastructure Systems Rapid Response Grants (RAPID)**

"RAPID: Collaborative Research: Implications of Social Distancing Policies on Water Infrastructure Systems"

## \$169,591

**National Science Foundation Civil Infrastructure Systems Rapid Response Grants (RAPID)** 

"RAPID: Collaborative Research: Implications of Social Distancing Policies on Water Infrastructure Systems"

### \$169,591

"An Equity-Focused Approach to Integrating Physical Activity and CS Education for K-8 Learners"

# \$254,998

**National Science Foundation Division of Social and Economic** Sciences Methodology, **Measurement and Statistics** (MMS)

"SABLE: Sensor-Based Assessment of Behavioral Lifestyles and Experiences"

### \$310,143

![](_page_50_Picture_0.jpeg)

Leading Engineering for

Texas Pediatric Society Foundation Grants

# America's Prosperity, Health, & Infrastructure (LEAP HI)

"Smart Sensing and Forecasting of Water Quality in the Water Distribution Network for Protection of Public Health"

### \$2,000,000

National Science Foundation Rapid Response Grants (RAPID): COVID-19 Response

"Identifying practices that minimize exposure to disinfection by products"

![](_page_50_Picture_10.jpeg)

"Addressing Childhood Adversity and Resilience Training"

### \$7,500

U.S. Housing and Urban Development

### Lead and Healthy Homes Technical Studies Program

"Linking Microbial, SVOC and Pro-Inflammatory Exposures in Homes to Childhood Asthma Severity: A Community Filter Forensics Approach"

### \$798,498

Graduate research assistants Kinglsey Nweye (left) and Sepehr Bastami (right) work on updates to the smart home beacon in the Intelligent Environments Laboratory on the UT campus.

# FY20 projects

# SARS-CoV-2 Surveillance in Wastewater (Project Canary)

Team: Mary Jo Kirisits (Civil, Architectural, and Environmental Engineering), Juan P. Maestre (Civil, Architectural, and Environmental Engineering), Kerry Kinney (Civil, Architectural, and Environmental Engineering), Suzanne Pierce (TACC)

In this project, Whole Communities–Whole Health is collaborating with Dr. Kirisits in the Department of Civil, Architectural, and Environmental Engineering to monitor wastewater to track the spread of SARS-CoV-2 in Austin. Researchers are collecting samples from city wastewater treatment plants and testing it for the novel coronavirus. The team is assessing how SARS-CoV-2 levels in wastewater correlate with parameters such as COVID cases, positivity rates, hospitalizations and hospital resources, among others, and how we can best use these methods to monitor and predict future pandemic spikes.

![](_page_52_Picture_0.jpeg)

# Clear Homes

Team: Juan P. Maestre (Civil, Architectural, and Environmental Engineering), Kerry Kinney (Civil, Architectural, and Environmental Engineering), Lynn Katz (Civil, Architectural, and Environmental Engineering), Edison Thomaz (Electrical and Computer Engineering), Sharon Horner (Nursing), Elizabeth Matsui (Dell Medical School), Felix Rivera-Mariani (Larkin University)

This project, funded by the U.S. Department of Housing and Urban Development, is investigating how participant-provided dust samples and home environment information can be used to understand how indoor exposures affect children with asthma living in the homes. Lessons learned from this study will inform the way families can work with Whole Communities–Whole Health to better understand their own air quality and how it affects their overall health.

# Dashboard Development

Team: Cameron Craddock (Diagnostic Medicine), Paul Toprac (Computer Science), Christine Julien (Electrical and Computer Engineering)

Whole Communities–Whole Health is developing an interactive smartphone app that will translate raw data collected during the cohort study into actionable, real-time information. Participants will be able to discern patterns in their own sleep quality, mood, physical activity, and environmental quality, among other variables. The team is also learning how to incorporate community-level information to give participants an understanding of how their household fits into the broader context of health where they live. As results are analyzed over time, community organizations can pinpoint issues and concerns on a systemic level and use this evidence to advocate for new policies or programs. Early prototypes of the dashboard have been shared with community members and potential participants throughout the development process.

# Environmental Home Beacon Testing & Development

Team: Zoltan Nagy (Civil, Architectural, and Environmental Engineering), Christine Julien (Electrical and Computer Engineering), Kerry Kinney (Civil, Architectural, and Environmental Engineering)

The Whole Communities–Whole Health team has built and tested a smart device that uses environmental sensors to better understand how indoor air quality affects family health by measuring indoor air pollution, carbon dioxide levels, humidity, and temperature in real time. Additionally, the team will develop an algorithm to understand the quantity and quality of human interactions based on the noise levels in the home.

The latest generation of the home beacon has been developed, tested, and calibrated through the efforts of many team members and is now able to reliably monitor a person's indoor environment. It has been deployed in two separate studies in 2020, and our team hopes to combine the data with that from other devices to see how a person's indoor environment might influence mood, activity, and sleep quality.

![](_page_53_Picture_4.jpeg)

E COMMUNITIES E HEALTH A UT Grand Challenge What does a healthy community look like to you?

We're a team from The University of Texas at Austin trying to build a more complete picture of health for Central Texas families. To do that, we're asking the experts - members of the community like you who understand what matters

most — to join us every step of the way

a.utexas.edu

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FAIR PAY

JUSTICE

Civil, Architectural and Environmental research associate JP Maestre demonstrates how a smart device detected fine particles in the air while the team was cooking taco fillings at a conference in Toronto in August.

# Parent Experiences with COVID-19 Qualitative Study

Team: Esther Calzada (Social Work) and Sarah Kate Bearman (Educational Psychology)

This study uses individual interview methodology to understand the challenges and coping strategies of parents raising school-aged children during the COVID-19 pandemic. We have recruited 14 parents to share their experiences. Our data will help us understand the challenges that they are facing as well as the ways in which they are managing those challenges. What we learn will give insight into the best way to support families in crisis in the Austin metro area.

# Project SMART: The Gamification of Physical Activity in Schools

Team: Christine Julien (Electrical and Computer Engineering) and Darla Castelli (Kinesiology and Health Education)

This project used technology integrated with educational goals to increase rates of physical activity and healthy eating among young people to reduce the risk of disease. We explored the use of a cooperative educational game coupled with lightweight wearable devices to promote both active transit to and from school and physical activity within school. Students joined the scientific process by making their own observations, providing interpretations, and solving problems. Further, students were able to program their wearable devices themselves, which engaged them in their own physical activity monitoring.

# Household Survey for Del Valle Residents

Team: Darla Castelli (Kinesiology and Health Education), Stephanie Morgan (Nursing)

Whole Communities–Whole Health gathered information about what Del Valle residents would want to know about their health through an online survey. We asked the heads of households in families we recruited who have at least one child to share information about mental and physical health, parenting, environmental concerns, and other social determinants of health like transportation and food security. Nearly 135 families have participated, and the survey is ongoing and continues to inform our understanding of families in eastern Travis County.

# Protect Texas Together App

Team: Cameron Craddock (Diagnostic Medicine) and Christine Julien (Electrical and Computer Engineering)

Whole Communities–Whole Health researchers were a part of a team that designed UT's Protect Texas Together app to help students safely return to campus amid the pandemic. Available to download to Android and Apple devices in English and Spanish, it has a symptom diary, where users can keep track of things such as fevers and coughs, and a place to log test results. If they are later diagnosed with an illness, they will have that information on hand to discuss with medical professionals. The app uses an algorithm to determine, based on one's symptoms, whether it is safe to come to campus, then issues a digital day pass to that person if they are cleared. It also allows students, faculty, and staff to get connected to health resources, find a testing location, and track county and state COVID-19 statistics.

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Cockrell School of Engineering senior Henry Rossiter participated in the design of the Protect Texas Together app to help students safely return to campus in fall 2020.

![](_page_55_Picture_4.jpeg)

# Sensing Daily Activities in Development

Team: Kaya de Barbaro (Psychology), Sarah Kate Bearman (Educational Psychology), Edison Thomaz (Electrical and Computer Engineering), Hannah Williamson (Human Development and Family Sciences)

This pilot study uses wearable technology to sense daily activities, such as child hyperactivity and tantrums, caregiver warmth and harshness, and child and caregiver play over time, which can help families and researchers understand more about moment-to-moment interactions and how they might affect child development and child and parental

mental health. More than 30 families have joined the study so far. The hope is to find non-intrusive ways to measure the frequency and intensity of developmental and behavioral difficulties to come up with innovative, low-burden assessments that will make it possible for mental health professionals to deploy interventions that will reach more families at risk.

# Tracking Coronavirus Through HVAC Systems

Team: Kerry Kinney (Civil, Architectural, and Environmental Engineering), Juan P. Maestre (Civil, Architectural, and Environmental Engineering)

This team is collaborating with researchers across UT Austin to investigate how we might be able to use the dust that collects within buildings to identify and track the virus in indoor environments. Researchers are using molecular techniques to detect whether or not the genetic signal for the coronavirus can be recovered from surface and HVAC filter dust samples collected from different types of buildings. The team has successfully been able to recover

the COVID-19 viral signal from surfaces as well as from HVAC filter dust. The discovery of the COVID-19 signal in filter dust is particularly important as it demonstrates that HVAC filters are removing the virus from indoor environments and that sampling filter dust can provide valuable information. Expanding on these findings, the research group is continuing to investigate how we can use dust samples to better understand and track the COVID-19 signal in buildings.

# Understanding How Discrimination During Adolescence Affects Health

Team: Aprile D. Benner (Human Development and Family Sciences), Jacob Cheadle (Sociology), Robert Crosnoe (Sociology), Keryn Pasch (Kinesiology and Health Education)

This pilot study focuses on how technology can help us learn how discrimination affects young people's physical and mental health. We tested the feasibility of integrating real-time methods of measurement, including sleep quantity and quality, physical activity, and cardiovascular indicators with daily journal entries and other available community-level data. By examining discriminatory processes and health during adolescence, findings suggest possible points of intervention, which could have the potential to address how discrimination and chronic stress may lead to a heightened and lasting risk for chronic disease.

# UT1000: Exploring New Methods for Understanding College Life

Team: David Schnyer (Psychology), Kerry Kinney (Civil, Architectural, and Environmental Engineering), Juan P. Maestre (Civil, Architectural, and Environmental Engineering), Zoltan Nagy (Civil, Architectural, and Environmental Engineering), Edison Thomaz (Electrical and Computer Engineering), Cameron Craddock (Diagnostic Medicine), Darla Castelli (Kinesiology and Health Education), Sam Gosling (Psychology)

This pilot project used sensing technology such as smartphone apps and wearable technology, self-reported surveys, and readily available grouplevel information like grades and attendance to get a picture of the lives of undergraduate students during the 2019-2020 school year. We looked at stress levels, sleep habits, and physical activity to see how these affected students' wellbeing. While the broader Whole Communities–Whole Health study will focus on young families

instead of young adults, the data collection process allowed our team to learn how best to set up the technology when working with future study participants and overcome new challenges related to handling large amounts of data in real-time. In addition, the team learned new methods for collecting relevant information, analyzing it, and returning it to participants in a useful way, which has laid the groundwork for our 5-year cohort study.

Whole Communities–Whole Health researchers show the pieces that make up the smart home beacon that will test indoor environments as part of the cohort study.

# UT1000 Follow-Up Studies: Using Smart Technologies to Measure Multiple Health Variables

Team: Frances Champagne (Psychology), Kerry Kinney (Civil, Architectural, and Environmental Engineering), Juan P. Maestre (Civil, Architectural, and Environmental Engineering), David Schnyer (Psychology), Zoltan Nagy (Civil, Architectural, and Environmental Engineering), Edison Thomaz (Electrical and Computer Engineering), Cameron Craddock (Diagnostic Medicine), Darla Castelli (Kinesiology and Health Education)

An extension of the UT1000 study examined the relationship among the biological indicators of stress, perception of stress, life events, and lifestyle in UT undergrads. In this phase, we used environmental home beacons, wearable activity bands, and smartphone-based surveys, as well as measured cortisol levels found in hair, to discover connections between other health factors and chronic stress levels over time. By focusing on more passive methods aimed to measure variables such as sleep, activity, fluctuating mood, and stress levels as well as home and dorm environmental characteristics, we were able to collect many layers of health variables without requiring a lot of in-person visits between scientists and participants. We are currently using this study to examine how COVID-19 is affecting stress, lifestyle, and coping skills.

![](_page_58_Picture_5.jpeg)

# A year in stories

Last year, Whole Communities–Whole Health researchers and their work were featured in a dozen different op-eds, blog posts, and news stories. We are excited to have our achievements and expertise recognized by these important publications. Read more about how our work is helping to improve health equity in Central Texas.

#### The Heart of the Matter: Why Relationships Belong in Research, By: Lourdes Rodríguez, Medium (Sept. 17, 2019)

Relationship-building takes time and investment. Rodríguez, former director of the Community-Driven Initiatives team at Dell Medical School, shares why community engagement is key to Whole Communities–Whole Health's mission.

#### Read more.

A Year in Pursuit of a Grand Challenge, By: David Schnyer, Medium (Oct. 3, 2019)

David Schnyer, Whole Communities– Whole Health inaugural chair and psychology professor, reflects on the grand challenge team's progress in its first year and what lies ahead.

Our Government and Public Institutions Must Protect Us Against the Unvaccinated, By: Karen Johnson, The Hill (Jan. 2, 2020)

When healthy people refuse to vaccinate themselves and their kids based on a philosophical or personal objection, they place others who cannot personally be immunized at risk for being exposed to devastating illnesses without their knowledge or consent, argues Johnson, an associate professor in the School of Nursing and Whole Communities– Whole Health researcher.

#### Toddler Tantrums: A Pandemic Survival Guide, featuring Sarah Kate Bearman, Lifehacker (April 3, 2020)

Parenting young children during this pandemic is a whole new level of difficult. From increased tantrums to sibling fights to disrupted sleep schedules, young kids are picking up on the fact that the world isn't a safe place. Bearman, an assistant professor in the Department of Educational Psychology, shares how the pandemic might affect young children.

#### Read more.

#### **Read more.**

Commentary: Get Health Care Workers Protective Gear Now, featuring Karen Johnson, San Antonio Express News (April 9, 2020)

Johnson pushes for the federal government to immediately provide PPE that meets the same rigorous standard health care providers have always used when caring for patients with highly infectious diseases.

**Read more.** 

Nursing Students and Educators Must Be Part of a National Public Health Surveillance Strategy, By: Karen Johnson, The Health Care Blog (April 20, 2020)

Here, Johnson calls on colleagues in nursing education to mount a nationally coordinated effort among nursing programs, professional nursing organizations, and regulatory boards to prepare nursing students and faculty to help with widespread testing and contact tracing amid the pandemic.

![](_page_61_Picture_0.jpeg)

![](_page_61_Picture_1.jpeg)

#### Real Health in Real Time, By: Mary Huber, Medium (May 10, 2020)

Whole Communities–Whole Health employs technology like smart home beacons so researchers can get a window into homes in real time and understand how environmental factors like indoor air quality affect family health.

#### Read more.

60

Which Austin-area ZIP Codes Have the Most Coronavirus Cases and Why, featuring Karen Johnson, Austin American-Statesman (May 23, 2020)

The coronavirus pandemic is battering communities of color in Central Texas at a disproportionately higher rate, highlighting disparities in health care access. Johnson sheds light on these findings.

Adula Armandarez (right) hugs volunteer Monica Allen (right) after receiving free face masks at Tomgro Grocery in the Montopolis neighborhood of Southeast Austin on May 15, 2020. Volunteers with the Montopolis Neighborhood Association and PODER gave 250 face masks to whomever needed them. Photo credit: J. Janner/Austin American-Statesman

#### A UT Undergrad Helped Build the App that Will Assist Students Coming Back to School this Fall. Here's What it Can Do, UT News (Aug. 6, 2020)

UT undergraduate student Henry Rossiter worked with researchers to build the Protect Texas Together app, which allows people to track their symptoms, record COVID-19 test results, get connected to medical resources.

#### Read more.

#### UT Students Help Develop App to Assist Students Returning to Campus, Fox 7 Austin (Aug. 12, 2020)

As UT students prepare to go back to school during the COVID-19 pandemic, an app developed by Whole Communities–Whole Health researchers, students, and Dell Medical School are looking to make that process run a little more smoothly.

![](_page_62_Picture_7.jpeg)

Coronavirus Perspectives: An information breakdown, featuring Mike Mackert, Medium (May 26, 2020)

Three UT researchers who have been sheltering in place amid the pandemic explain how the COVID-19 crisis is an information crisis.

**Read more.** 

**Read more.** 

#### New UT App Will Help Students Track Symptoms, Record COVID-19 Test Results, KXAN (Aug. 19, 2020)

An app developed by a team of students and researchers at the University of Texas at Austin helps minimize the spread of the COVID-19 on campus.

# Whole Communities-Whole Health Leadership

#### **Organizing Committee:**

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Germine Awad Educational Psychology

Karla Lawson Surgery and Perioperative Care Population Health

Amanda Barczyk (2018-2020) Population Health Founding member

Sarah Kate Bearman Educational Psychology Psychiatry Founding member

Esther Calzada (2019-2020) Social Work

Darla Castelli Kinesiology and Health Education Co-chair and founding member

Frances Champagne Psychology Past chair and founding member Founding member

Michael Mackert Advertising and Public Relations Population Health Founding member

Julie Maslowsky (2018–2019) Kinesiology and Health Education Founding member

Zoltan Nagy Civil, Architectural, and Environmental Engineering Founding member

Lourdes Rodríguez (2018-2020) St. David's Foundation Founding member Karen Johnson Nursing Founding member

Kerry Kinney Civil, Architectural, and **Environmental Engineering Co-chair and founding member**  **David Schnyer** Psychology Psychiatry **Inaugural Chair and founding member** 

#### **Community Strategy Team:**

Maggie Aguas AVANCE

**Kellsey Ballard Del Valle ISD** 

**Rebecca Gomez Del Valle ISD** 

**Charles Moody Community Coalition for Health** 

Ada Ohueri Sickle Cell Association of Texas

Avi Santos Volunteer Healthcare Clinic

Ellen Gonzalez Mama Sana Vibrant Woman

Mia Greer **Community Coalition for Health** 

**Carol Lilly Boomers Collaborative** 

Barbara Soriano Del Valle ISD

Aidé Sustaita **Del Valle ISD** 

Nain Yepez Any Baby Can

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![](_page_66_Picture_0.jpeg)

![](_page_66_Picture_1.jpeg)

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